

The value of foreign varieties

The process of importing varieties and the destiny of foreign varieties once they have been cleared through quarantine are vital components of the BSES-CSIRO breeding program. BSES researchers Dr George Piperidis and Dr Nicole Thompson discuss the outcomes.

Growers and industry personnel often ask BSES staff: "Why don't you import some smut-resistant varieties from Brazil or other countries and release them to the industry?" Our ready reply is this: "BSES imports smut-resistant varieties from several countries; however, these varieties are only released to the local industry when we confirm that they are superior in performance and disease resistance to varieties selected locally."

The Australian sugar industry has benefited greatly from the importation of foreign varieties for commercial production. Before extensive breeding programs commenced in Australia, growers relied on a stream of imported varieties to overcome the effects of diseases and local climatic conditions. Some of the most notable foreign canes in Australia include Badila (Papua New Guinea), POJ2878 (Java 'Wonder cane'), CP29-116 (Florida), NCo310 (South Africa), CP44-101 (Florida) and H56-752 (Hawaii).

Since 1999 BSES has imported 416 varieties (with preference given to smut-resistant varieties) from 14 countries including Brazil, China, Colombia, Mauritius, and the Philippines (see Figure 1). Currently there are 142 foreign varieties undergoing quarantine.



Figure 1: Number of varieties imported from each country since 1999 (not including those currently in quarantine).

Logistics

BSES works in partnership with the Australian Quarantine and Inspection Service (AQIS). When imported varieties arrive in Australia, the cane is planted in the AQIS-approved sugarcane nursery at BSES Indooroopilly. The cane stays in quarantine for a minimum of two years (or two growth cycles), during which time it is hot-water treated, regularly inspected, and laboratory-tested to ensure it is free of exotic diseases (examples are listed in Table 1). This list is likely to change over time as new disease incursions occur overseas, and as BSES exchanges varieties with more countries.

Table 1: Current diseases tested for in quarantine at the BSES Indooroopilly facility.

Disease	Causal agent	Country
Mosaic	Sugarcane mosaic virus (SCMV) Sorghum mosaic virus (SrMV)	All*
Fiji leaf gall	Fiji disease virus (FDV)	All*
Streak	Sugarcane streak virus Maize streak virus	South Africa, Mauritius, Reunion
Streak mosaic	Sugarcane streak mosaic virus	China, Philippines
White leaf Grassy shoot	Phytoplasmas	All Asian countries
Ratoon stunting disease (RSD)	<i>Leifsonia xyli</i> spp. <i>Xyli</i>	All***
Leaf scald (LS)	<i>Xanthomonas albilineans</i>	All***

*SCMV Strain A is present in some regions of Australia, however there are many other strains that are exotic.

**FDV is present in parts of Australia.

***Both RSD and LS are present in Australia, and cane can be cured from infection.



Above: Dr George Piperidis with members of the Mitr Phol Sugarcane Research Centre, Thailand.

To date there has been no finding of exotic pests, diseases, or pathogens in any of the cane held in the quarantine glasshouse. The plant crop and ratoon in the glasshouse are used for disease testing and inspections, and provided that imported cane has no disease symptoms or positive assay results, the replant crop is released from quarantine. The imports then enter the BSES-CSIRO plant breeding program which uses the crossing facilities at BSES Meringa. Prior to release they are propagated for testing in selection trials in all regions.

Performance

In general the overall performance of foreign varieties in BSES trials is not as good as locally-bred varieties. However, imported varieties are an important source of diversity and of new genes for resistance to diseases such as smut. Consequently, they play an important role as parents in the development of new cultivars. For example, 21 of the last 50 'Q' varieties have at least one foreign variety as a parent.

The future

BSES continues to look for new opportunities for variety exchange. Recently, a unique three-way exchange agreement was negotiated between BSES, Centre de Cooperation Internationale en Recherché Agronomique pour le Développement (CIRAD) in Guadeloupe, and the Central Romana breeding program of the Dominican Republic. The Central Romana program is well recognised for its production of drought-tolerant varieties.

A new agreement is currently under negotiation with Mitr Phol (Thailand), a privately owned organisation with a research centre conducting sugarcane breeding. Dr George Piperidis recently visited the Mitr Phol Research Centre with the support of BSES and a SRDC Travel and Learning Opportunity Project. The objective of this visit was to establish the necessary networks for variety exchange and to discuss in detail the terms and conditions for a variety exchange agreement.

One of the outcomes of George's visit was a draft agreement which has the full support of both BSES and Mitr Phol staff and management. This agreement should be finalised soon, and an exchange of varieties will occur within the next two years. Varieties from Thailand will be valuable to the Australian industry because they are derived from a different genetic base and are generally resistant to smut and white leaf disease.

Conclusion

The BSES breeding program is world class, but it couldn't remain so without the valuable contribution of foreign varieties. The logistics involved in importing foreign varieties is time-consuming but worthwhile, because they have proven their excellence as parents in the breeding program. BSES is proactive in seeking out new genes for Australian sugarcane varieties, and the research team never releases any variety before it has been tested locally and found to match the performance expectations of current varieties. With 142 foreign varieties soon to finish their quarantine period, the future of sugarcane breeding looks very exciting.



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Above: Dr Nicole Thompson is the Quarantine Pathologist at BSES and is responsible for maintenance of the AQIS Quarantine Nursery and conducts of all the disease testing.



Above: Dr George Piperidis is the Program Leader for Variety Adoption and is responsible for initiating the exchange of varieties with foreign partners.